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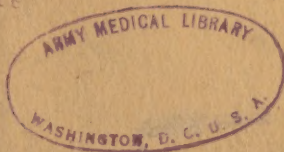
A. J. S. S.
INTELLIGENCE
WASHINGTON, D. C.

CIVIL AFFAIRS HANDBOOK

FRENCH INDO-CHINA

SECTION 13 : PUBLIC
HEALTH AND SANITATION

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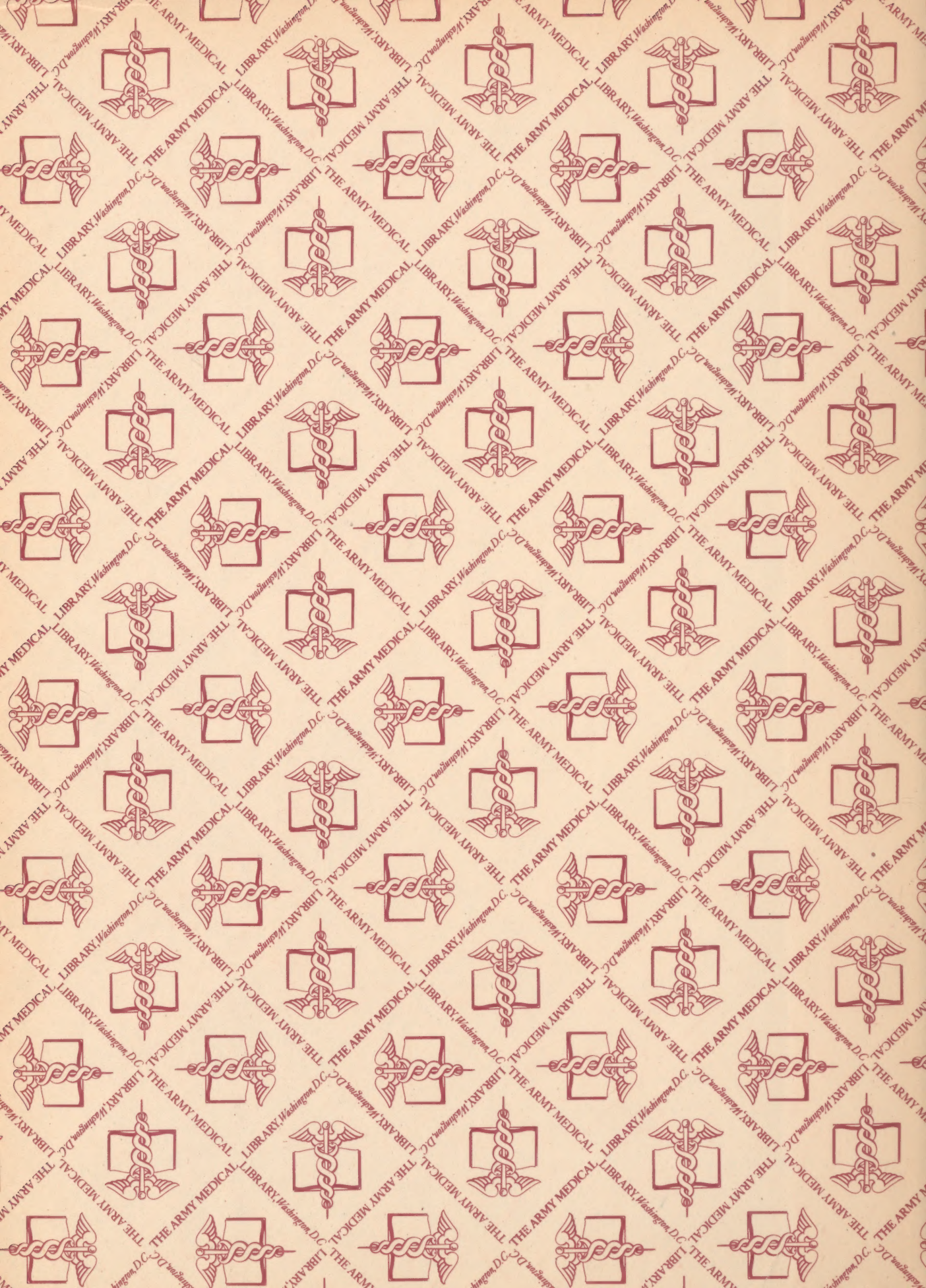


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CIVIL AFFAIRS HANDBOOK

FRENCH INDO-CHINA

SECTION 13 : PUBLIC

HEALTH AND SANITATION



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M1 - M99	Basic and Advanced Training
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M200 - M299	Personnel and Morale
M300 - M399	Civil Affairs
M400 - M499	Supply and Transportation
M500 - M599	Fiscal
M600 - M699	Procurement and Production
M700 - M799	Administration
M800 - M899	Miscellaneous
M900 - up	Equipment, Materiel, Housing and Construction

* * *

HEADQUARTERS, ARMY SERVICE FORCES,
Washington 25, D. C. November 16, 1943

Army Service Forces Manual M 359-13, Civil Affairs Handbook - French Indo-China, Section 13, Public Health and Sanitation, has been prepared under the supervision of The Provost Marshal General, and is published for the information and guidance of all concerned.

[SPX 461 (21 Sept. 1943).]

By command of Lieutenant General SOMERVELL:

W. D. Styer,
Major General, General Staff Corps,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
Adjutant General.

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CIVIL AFFAIRS HANDBOOKS

T O P I C A L O U T L I N E

1. Geographical and Social Background
2. Government and Administration
3. Legal Affairs
4. Government Finance
5. Money and Banking
6. Natural Resources
7. Agriculture
8. Industry and Commerce
9. Labor
10. Public Works and Utilities
11. Transportation Systems
12. Communications
- *13. Public Health and Sanitation
14. Public Safety
15. Education
16. Public Welfare
17. Cultural Institutions

This study on Public Health and Sanitation in French Indo-China was prepared largely by the Medical Intelligence Branch of the Office of the Surgeon General.

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INTRODUCTION

Purposes of the Civil Affairs Handbook.

The basic purposes of civil affairs officers are (1) to assist the Commanding General by quickly establishing those orderly conditions which will contribute most effectively to the conduct of military operations, (2) to reduce to a minimum the human suffering and the material damage resulting from a disorder and (3) to create the conditions which will make it possible for civilian agencies to function effectively.

The preparation of Civil Affairs Handbooks is a part of the effort to carry out these responsibilities as efficiently and humanely as is possible. The Handbooks do not deal with plans or policies (which will depend upon changing and unpredictable developments). It should be clearly understood that they do not imply any given official program of action. They are rather ready reference source books containing the basic factual information needed for planning and policy making.

Revision for Final Publication.

The material in this section was prepared largely by the MEDICAL INTELLIGENCE BRANCH of the OFFICE OF THE SURGEON GENERAL.

OFFICERS USING THIS MATERIAL ARE REQUESTED TO MAKE SUGGESTIONS AND CRITICISMS INDICATING THE REVISIONS OR ADDITIONS WHICH WOULD MAKE THIS MATERIAL MORE USEFUL FOR THEIR PURPOSES. THESE CRITICISMS SHOULD BE SENT TO THE OFFICE OF THE CHIEF OF THE SURVEY AND RESEARCH SECTION, MILITARY GOVERNMENT DIVISION, P. M. G. O., 2807 MUNITIONS BUILDING, WASHINGTON 25, D. C. (OR PHONE WAR DEPARTMENT EXTENSION 76322).

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MEDICAL AND SANITARY DATA ON FRENCH INDO-CHINA

I. PUBLIC HEALTH AND ENVIRONMENTAL FACTORS INFLUENCING HEALTH AND SANITATION. -- 1. Public Health Department. -- a. Organization. Since 1914 the health work in Indo-China, formerly under the naval and colonial doctors of the military authorities, has been under the direction of the Inspector General of Hygiene and Public Health, who is appointed by the French Ministry of Colonies. Working directly under the Inspector General are various services for the development of preventive medicine and the care of the sick, both European and native. The five states, Tonkin, Annam, Laos, Cambodia, and Cochinchina, plus the area Kouang-Tcheou-Wan leased from China, each have a local health director who works under the Inspector General.

The Office of the Inspector General of Hygiene and Public Health is responsible for enforcement of the public health law, supervision of maritime and domestic quarantines, and oversight of government hospitals, the Pasteur Institutes, the school of medicine, and the pharmacological agencies. It exercises control over the medical facilities which all industries (including plantations) must provide for their workers. The Inspector General is also responsible for the medical work among the troops, though the actual conduct of this work is carried on by the military medical personnel.

The work of the Health Department is divided into four chief divisions or services. The administration division carries on the duties of keeping records, handling financial accounts, and supervision of property belonging to the health department. The preventive medicine division conducts the special epidemiological campaigns, vaccination program, educational and publicity efforts, general sanitation, and all general preventive procedures in conjunction with the Pasteur Institute and the Division of Medical and Social Assistance. The division of medical supervision looks after the inspection of public works, public houses, clinics, and other special medical services. Finally, there is the division for the control of drugs and their sale.

Actual conduct of the health program is entrusted to the officers in the chefs-lieux or capitals of the provinces. All statistics are gathered through these officers at the chefs-lieux, who in turn report to the local director of the state. The port facilities are supervised by the port medical officers.

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A diagram outlining the public health organization for Indo-China is found in the appendix. (Chart: Public Health Organization).

Table 1 shows the budget as officially reported for the Union, together with the percentage of the total budget allocated to health for the years 1922 through 1937. Various reports of the budget in different sections often do not agree, due to a peculiar form of accounting. Thus in 1925 the League of Nations reported a total budget for the country of 1,267,670,044 piasters, of which 45,704,463 piasters were provided for health and sanitation. The difference between this figure and the 5,200,000 shown in Table 1 for the same year is due to the fact that the larger figure takes in the money allotted by each state and by the provinces, whereas the smaller figure represents only that sum allotted by the Union.

Table 2 records the 1935 death and birth rates for the different parts of the Union. The birth rate has been appreciably greater than the death rate for many years, indicating a steady increase in the population.

b. Scope and Effectiveness. Because of the rather excellent means of communication compared to Asia as a whole (roads, railways, and waterways), the health problems have been more easily solved. Each of the five states which make up the Union of Indo-China has its special problems. The difficulties of carrying out an effective program are greater in Laos State than elsewhere, because the people are more primitive, the means of dispersing information fewer, and the population comparatively more sparse. The willingness of the people of Indo-China to accept the benefits of Western medicine, even though opposed to Western politics and economics, has assisted in the development of the public health program. As in most countries in the East, there is no separation of public health and medical aid to the individual. The native mind cannot separate preventive from curative medicine, and views with suspicion those attempting to administer a purely preventive program. On the other hand, the doctor who renders medical care is accepted for all types of programs. Furthermore, trained personnel and funds are hardly sufficient to carry out both programs separately. The presence of four Pasteur Institutes with their laboratory facilities in the five states has been a great stimulus to the preventive programs wherever needed.

The medical services offered in Indo-China are on the whole superior to those of Thailand, Burma, and the Dutch East Indies. The medical school at Hanoi, one of the best in the Orient, has provided native medical practitioners for the work. Diagnostic procedures offered by the various laboratories also increase the efficiency of the medical work. On the other hand, the Government has in many instances failed to assist medical missions when it might have done

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so to the great advantage of the sick, and many of the health programs outlined on paper are carried out in a very desultory fashion. The machinery for combatting serious epidemics is, however, present and has been effective when the need arose.

2. Water. As in all tropical countries, the water in Indo-China is in general not safe to drink unless disinfected. The provincial capitals and the larger cities together with many smaller places attempt to supply potable water, which is examined by laboratories controlled by the Pasteur Institute. Water supply comes from nearby rivers or streams, canals, shallow wells, and in a few instances from deep wells. Bottled water from France is usually obtainable in the larger cities and furnishes a safe supply. It is the general opinion that even the water supplies which are treated should be looked upon with suspicion as the pipe lines are often inadequately laid or the treatment system may temporarily be out of order with no warning to those using the water. It is safe to say, however, that more is being done throughout Indo-China to provide potable water for the people than in most tropical countries.

3. Sewage. Sewage disposal is in general unsatisfactory. In the cities and places provided for tourists, flush toilets are in use, but except in certain instances no care is given to the actual disposal of the sewage. Night soil is used regularly and universally in the delta region for fertilizer. Women go about at night with little bamboo baskets collecting excreta from the ditches and other places where it is deposited and later sell the same to the farmers. Some attempt is being made to introduce simple pit latrines, but this at best will take years to become universal. In the rainy season there are large numbers of flies which have as free access to excreta as to food.

4. Insects and Animals of Importance to Man and Their Control.
-- a. Vectors of Disease. -- (1) Mosquitoes. Over 50 different species of mosquitoes have been found.

(a) Anopheles. Malaria is one of the most important diseases of Indo-China, but the vectors vary in importance in different parts of the country. Twenty-three species of Anopheles have been found, twelve of which are proven vectors of malaria. Below is a list of those known to be malaria vectors and the locality where they have been found.

- | | |
|-------------------------|--|
| <u>A. fuliginosus</u> : | Annam at Hue (Dalat); and in Cochin-China at Saigon. |
| <u>A. hyrcanus</u> : | Annam at Hue, Yaback and Dalat; in Cochin-China at Saigon and Toy-san near Chaudoc; in Tonkin at Haiphong. |
| <u>A. maculatus</u> : | Annam at Dalat and Yaback; north of Kakto in the province of Moi Kontum and south of Plei-ku in |

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the same province; in Cochin-China at Gia Nhan; in Tonkin at Hanoi and Haiphong; in Laos and Cambodia.

- A. stephensi: Annam at Hue; Tonkin at Haiphong.
- A. subpictus: Annam at Hue; Cochin-China at Saigon; Tonkin at Hanoi.
- A. vagus: Cochin-China at Bac Lieu in the province of Soc-trang; Can Tho in the northwest near Bassac; Chaudoc and Gia Nhan; Saigon and Suzannah; Delta region, Tonkin.
- A. minimus: All states.
- A. jeyporiensis: All states.
- A. tessellatus: Delta region, Tonkin.
- A. leucosphyrus: Laos.
- A. aconitus: Delta region, Tonkin; Cambodia and Cochin-China.
- A. barbirostris: Cochin-China.

(b) Aedes. Aedes mosquitoes, possible vectors of dengue, have been identified at the following places:

- A. aegypti: Cochin-China at Bac Lieu, Chaudoc, Hue, Saigon, and Suzannah Suoi Bi; Annam at Dalat.
- A. albopictus: Cochin-China at Saigon; Annam at Yaback; Tonkin at Haiphong.
- A. vittatus: Cochin-China near Saigon; Annam at Yaback and in Southern Annam.

(c) Culex. The Culex mosquito is found in all parts of Indo-China. The following have been identified in Cochin-China:

- | | |
|---------------------------|--|
| <u>C. bitvemorhynchus</u> | <u>C. vishnui</u> |
| <u>C. gelides</u> | <u>C. fatigans</u> (the most numerous) |
| <u>C. mimeticus</u> | <u>C. fucocephalus</u> |
| <u>C. mimulus</u> | <u>C. brevipalpis</u> |
| <u>C. sitiens</u> | <u>C. malayi</u> |

(2) Lice. The three common lice associated with humans are found in Indo-China, Pthirus pubis (the pubic or crab louse), Pediculus humanus var. capitis (the head louse), and Pediculus humanus var. corporis (body louse). The latter is responsible for the spreading of relapsing fever and of epidemic typhus found in several sections of Annam, Cochin-China, and Tonkin. There are other animal lice which have no importance in the spread of disease to man. The Polyplax spinulosus or rat louse transmits typhus from rat to rat, but does not bite man.

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(3) Flies.--(a) The common house fly (Musca domestica) is prevalent throughout Indo-China and is without doubt one of the principal factors in the spread of intestinal diseases, especially the bacillary types. The enormous number of flies during the rains makes it almost impossible to prevent infection of foods. In the smaller cities, towns and villages the unsanitary method of fecal disposal and the omnipresence of flies form a combination which readily explains the high incidence of dysentery. To guard against this type of spread, all quarters, especially the messes, should be well screened and the premises sprayed frequently.

(b) Tabanidae. The horse and deer fly are found throughout the country. Though not known to carry any diseases common to man, they are a real curse to anyone who may have to be in the jungles from May through October. Their bites swell and itch considerably, even disabling a person for a short time. The horsefly spreads the Trypanosome evansi, causing "surra" in horses by direct transmission. From the month of May until after the full moon in August (according to native superstitions) the spread of this disease is almost certain among horses or mules, especially in the northern part of Indo-China.

(c) Psychodidae. The Phlebotomus genus has been studied in the northern half (15° to 25° N. latitude) of the Union, and the following species identified: P. stantoni, P. argentipes, P. baylii var. campester, P. barraudi, P. sylvestrii, P. tonkinensis, P. hibernus, P. silvaticus, P. morini, P. iyengari. Of these, P. argentipes is known to be a vector of kala-azar in India.

(4) Ticks. No tick-borne disease of humans has been reported from Indo-China, though it is possible and probable that such diseases exist, such as tick paralysis. Ticks on animals are described in the reports of the veterinary workers. Exact names are not given.

(5) Fleas. The Xenopsylla cheopis of the rat is the chief vector of plague in Indo-China. Though found throughout Indo-China, it is known to be infected with plague only in the larger centers. X. astia though potentially a plague carrier, is a poor one, and does not carry it over from year to year. Endemic typhus is also transmitted by X. cheopis, although the number of cases reported is comparatively small. Pulex irritans, though probably not a vector of disease, is found in Cochin-China and southern Annam.

(6) Rats. The black rat, Rattus rattus, is probably the commonest of the rats. In any country where bamboo grows luxuriantly, as in Indo-China, Thailand, and Burma, the year following the flowering of the bamboo (about every five to ten years), there is always a plague of rats, the bamboo rat. This is due apparently to the dying of the bamboo and a shortage of the normal food supply of the rat. As a consequence, great hordes of rats sweep across the paddy lands and cause an enormous loss in the rice crop, with resulting famine. This is particularly true for the mountain and plateau sections of northern Indo-China.

The gray rat, Rattus norvegicus, is found in Thailand and doubt-

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less occurs also in Indo-China, but is not as important as R. rattus.

(7) Other Disease Vectors. --(a). The larval stage of the mite Trombicula serves as a vector of mite typhus, the same as the tsutsu-gamushi fever of Japan. The mite lives in the ears of the field mouse, Microtus montebelloi. Infection passes from the adult to the larvae by inheritance. The larval mite feeds only once and then drops off and the adult develops in the ground, attaching itself to the mouse after reaching the adult form.

(b) The snails, Planorbis or Segmentia, found on the edges of fresh waterways, are intermediate hosts for the cercariae of the fluke, Fasciolopsis buski. The miracidia hatch out of the eggs of F. buski and enter into the snail, where the cercariae develop. They, in turn, become free-swimming and encyst on water chestnuts (Eliocharis tuberosa).

b. Snakes and Other Dangerous Animals. The poisonous snakes of Indo-China are similar to those of India, Burma, and Thailand. There are the coral snake (Micrurus fulvius), the banded krait (Bungarus fasciatus), and the Russell's viper (Vipera russelli) which grows to four or five feet long. There are other pit vipers (Crotalidae). These poisonous snakes rarely trouble people if they are not stepped on or rudely disturbed. There are three kinds of cobras: the ordinary Indian cobra (Naia naia) which rarely grows to over five feet long, distinctly brown in color, with the characteristic spectacles on the back of the head. Very little is reported concerning the black cobra which is somewhat larger than the Indian cobra and somewhat more dangerous. The king cobra (Naia hannah) is the most intelligent of all snakes and probably one of the most dangerous because of its intelligence and its extremely poisonous bite. It has a brownish color which is distinctly shiny. The adult snake is usually about 12 to 15 feet long, though one 18 feet long has been reported. The diameter is unusually small (2-1/2 inches) for such a long snake. The cobra attacks during the mating season and when attempting to protect its young. It will not only bite if stepped upon but advance upon its enemy with considerable animosity.

Tigers, leopards, and bears are found in certain areas. Under ordinary circumstances they are far more afraid of humans than humans are of them. The wild boar is very dangerous and should be avoided unless a person is well-armed. Poisonous fish along the coast line from Tonkin to Cochin-China are well known to the natives. The necessary information as to their danger to swimmers should be obtained locally.

c. Leeches (Annelida), particularly the land leech (Haemadipsa zeylanica) which occurs in very wet places and during the rains, are found on the grasses and weeds along the paths and near water holes. Their bites itch a great deal and bleed profusely, due to the non-clotting fluid which is secreted during the sucking process. Infection at the place of biting is the chief danger. A leech may be removed by

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snapping it on the free end, which usually irritates it sufficiently so that it lets go temporarily, and then may be snapped completely off. By applying salt, moist tobacco or the lighted end of a cigarette, the same results may be obtained. The best way to prevent leech bites is by wearing leggings.

5. Food and Dairy Products in Relation to Health. Rice and fruit can usually be obtained in sufficient quantities throughout Indo-China. It is always well, however, to stock up with sufficient rice supplies in the plains if expecting to travel into the mountain or plateau regions of the interior, for the rice supply of the interior is usually sufficient for only a relatively small number of people. Fruit of the country is excellent. Meats, however, would be difficult to obtain in supplies sufficient for any large number of troops. Cattle are likely to be infected with tuberculosis and tapeworm, and hogs have a high incidence of trichina infections. In general, it may be said that food, fruit and water are easily obtainable in the lowlands. In the plateaus and mountains it is necessary to plan to transport all needs for the mess.

The milk supply of Indo-China has been limited to the herds which are owned and worked by East Indians. Milk sanitation is almost unknown and the quality of the milk is poor. For that reason, those who use milk have been dependent upon the canned supply, dried, evaporated, or sweetened condensed. There are at least ten different kinds of evaporated and condensed milk on the market in the various centers throughout Indo-China. These have been largely supplied by the Anglo-Swiss Company (Nestle Brand) to the exclusion of all other foreign brands. The laws require that the label shall say exactly whether it is condensed, fresh whole milk, or fresh skim milk; the date of packaging must also be printed, not stamped, upon the label. The price of this milk is high, one can of milk costing the equivalent of two days of a laborer's pay.

6. Miscellaneous Problems of Sanitation. -- a. Toxic Plants. -- Antiaris toxicaria (Family Moraceae), the sack tree or the deadly upas tree, grows to a height of 30 meters and has a leaf much like that of an elm tree. The sap, which resembles the milklike latex of the rubber tree, is the poisonous part. It is used for arrow poisoning.

Laportea (Family Urticaceae): Various species of poisonous nettles are found in Tonkin, Annam, and Cochin-China. Locally they go by the names of "mang ong voi", "ribon", or "nan tia to." The plants grow to a height of three to five meters. The leaves are pointed, heart-shaped, toothed or serrated on the edges, with the poisonous hairs or nettles on the edges of the leaves. Local application of ammonia is effective in relieving the eruption which results from contact with these nettles.

Colocasia, or taro (Family Araceae) is a root or tuber. Certain kinds are eaten in large quantities by the natives. The leaves of the plant are large and similar to the shape of elephant ears, from which it gets its local name ("elephant ears"). Certain of these roots are very toxic when eaten. To toxic material (a sapotoxin) seems to be present in greater quantity during the latter part of the summer before the end

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of the rains.

Derris elliptica or malaccensis: The root of this plant is a poison used to poison fish, and therefore prohibited in certain areas. It is raised and collected for economic reasons. About 80 percent of the amount produced is exported.

b. The yearly monsoons are much worse in the southern part of Indo-China than in the northern sections. During the rains, the humidity and high temperatures furnish a marked comparison to the dry season, with its comparative cold and dryness. During the cold season, considerable clothing is necessary. Facilities for heating buildings are negligible, with the result that respiratory diseases are common during the cold season. As the roads and railroads make it possible to move troops the entire length of the land within two or three days, it is always necessary to bear in mind the radical climatic changes which will be met.

II. MEDICAL FACILITIES. -- 1. Hospitals. The hospital facilities in Indo-China, for a tropical country, are unusually good. The capital of each of the five states has diagnostic clinics to meet all needs of the modern doctor. The capital (chef-lieu) of most of the provinces into which the states are divided also has a fairly well-equipped hospital. In the larger centers of population there are also hospitals with considerable equipment. Table 4 shows the number of hospitals and dispensaries from 1928 to 1937, together with the number of cases admitted to the hospital and the total number of treatments given. Table 3 indicates the hospitals and other medical institutions of the states, together with the area, population, and number of provinces of these states for 1937. Map 1 shows the location of the hospitals in the various states.

a. Number of Beds. In 1921 there were reported 336 hospitals, dispensaries, and maternity centers, together with various health centers. In 1924 this number had increased to 459, and in 1937 there were over 700 medical units. The actual number of beds for all Indo-China is not recorded, but from available statistics, there are probably over 15,000 beds in the Union. The exact number of beds in the Saigon area for ten different hospitals is 6,500. In the state of Annam, in some 20 hospitals there are over 3,500 beds.

b. Equipment. The equipment of the hospitals in the larger centers is of modern design, supplying all needs for modern treatment and diagnosis, but the smaller hospitals in the capitals of the provinces have more limited equipment. In the case of special needs with which these smaller hospitals are not prepared to cope, the patient is transported to the state capital hospital. There are no factories making hospital equipment in Indo-China.

c. Supplies. Medical supplies for Indo-China are controlled by the Inspector General of the Services of Hygiene and Sanitation. These

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are usually brought from France and distributed to the pharmacies in all capitals of the states. The state Directors of Health and Sanitation redistribute them to the pharmacies in the larger centers of the provinces. In this way, control of the quality and quantity of drugs and of medical supplies is carefully supervised. Small amounts of quinine are produced and processed in Indo-China under direction of the Government.

2. Medical Practitioners. — a. Physicians. The total number of physicians in Indo-China in 1937 is shown in Table 5. These figures do not include the doctors in private practice, of whom there are over 200 in the larger centers.

b. Nurses. Nursing in Indo-China is carried on by male nurses far more than in any other country of the Orient. The "infirmier", if not in charge of a dispensary, may have the task of nursing in the hospitals. There are a few female nurses. The need for female nurses is largely met by the "sage femme" and the "Ba-mu", who are midwives with various degrees of training. The distribution of these by provinces is shown in Table 5.

c. Dentists. There are comparatively few dentists throughout the Union (about 100). Such dentists as have settled are of French, Japanese, and Indo-Chinese nationality, and are quite well trained. The dentist's assistant of a few months' training, later setting up as a full fledged dentist, as found in Thailand and Burma, is not found in Indo-China.

d. Veterinarians. Veterinary personnel are usually under the direction of the Pasteur Institute.

e. Others. Infirmiers and infirmieres are less well trained than doctors but usually better trained than nurses. They serve in a multiple capacity as the specific need demands; as vaccinators, compounders of drugs, and even as doctors in the rural areas whenever necessary. Many of them do the actual nursing work in the hospitals. Besides the infirmiers, there are the European and native midwives, and finally the rural midwife, locally called the Ba-mu. Certain states include a group of laborers or ward servants in addition to the above classification. Table 3 also shows besides the various number of Indo-Chinese doctors, the infirmiers (or compounders) and midwives.

3. Medical Institutions, including Laboratories. — a. Medical Schools. French Indo-China has an unusually large number of medical institutions. The first and perhaps the best known is the medical school at Hanoi, founded by Governor-General Doumer January 6, 1920. It has had a slow but steady growth until now its students are admitted for further work in the best medical schools of France. There are sections of medicine and surgery, stomatology, veterinary medicine, pharmacy, and anthropology. The school is affiliated with three hospitals, 1'Hopital du Protectorat; 1'Hopital Rene-Robin, and 1'Institut Ophthalmologique.

b. Pasteur Institutes. There are four of these:

- (1) Institut Pasteur de Saigon) dealing with human disease
- (2) Institut Pasteur de Hanoi)
- (3) Institut Pasteur de Nhatrang, which prepares vaccines and serums for diseases of animals, as well as doing research work on animal diseases.
- (4) Institut Pasteur de Dalat, which prepares various vaccines

The Pasteur Institutes, with laboratories established by them and under their direction in various localities, offer special diagnostic facilities in various diseases, giving stool examinations for the detection of intestinal worms, amebic and bacillary dysentery, and cholera; serological examinations for typhoid, typhus and syphilis; the examination of pus and of blood (for malaria and filariasis); of cerebrospinal fluid, bile, gastric juice urine, calculi, and milk. Water is examined whenever requested, usually in most of the large cities and the various chefs-lieux. The water of sixty mills near inhabited centers is also controlled. Food is examined for prevention of fraud.

The Institute at Dalat is chiefly engaged in making vaccines (typhoid, cholera, plague) which are used by all physicians of the country, in the Army and Navy, and in private hospitals. The personnel in 1937 was: 14 physicians, 4 veterinary surgeons, 5 chemists, 2 entomologists, 3 laboratory assistants, 6 native doctors, 80 medical assistants, 100 laborers.

Plant studies are also carried on in connection with the rubber tree, the tea tree, the coffee tree, the kola tree, the cinnamon tree, "eleois", kapok, the forest trees, and cinchona or quinaquina trees.

c. The Institut du Radium de l'Indochine at Hanoi, with branches in other cities of importance, provides for the diagnosis and treatment of diseases requiring radium and X-ray.

d. Social Services:

- (1) Asylums for the insane (1 in Cochin-China
(1 in Tonkin)
- (2) Leper colonies (4 in Annam (agricultural colonies)
(1 in Cambodia (agricultural colony)
(6 in Tonkin
(1 in Cochin-China (mixed asylum and
agricultural colony)
(2 in Laos
- (3) Religious homes: orphanages for children, homes for

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the incurable, homes for the aged,
and homes for the blind - over 100
in all five provinces

(4) Private Industry:

- (a) Railroad hospitals at strategic points along the railroad
- (b) Hospitals on the ten plantations
- (c) Hospitals and dispensaries on rubber plantations
- (d) Dispensaries maintained by timber companies

(5) Red Cross organizations in the various states

(6) One Child Welfare and Maternity Center at Vientiane
(capital of Laos)

(7) Antituberculosis League of Tonkin

III. DISEASE INFORMATION. (See Table 6)

1. Diseases of Special Military Importance. -- a. Malaria. Malaria is responsible for the greatest amount of recorded illness and, except for minor ailments, is undoubtedly the cause of the greatest number of unrecorded sicknesses. Approximately one-fifth of all hospital cases treated in 1937 were due to malaria, varying from 15.7 percent in the state of Tonkin to 28 percent in the state of Laos. Every native who reaches the age of twenty-five has had malaria one or more times. This would not apply to natives of the large cities in which there is no malaria, or to those who live in high mountain villages and do not come to the plains to sleep.

The heaviest malaria incidence is not found in the low regions, but rather on plateaus and in the foothills of the mountains. (See Map 2). The Delta region of the Red River around Hanoi and Haiphong, and the Delta region of the Mekong River passing through Saigon in Cochinchina show a comparatively low malaria incidence. The dual rainy seasons have a marked influence on the morbidity curve. There are four peaks -- one at the beginning and one at the end of each rainy season, with a high average throughout the period of rains.

In detailed studies of the mosquitoes of the Delta region of Tonkin, the following *Anopheles* were found:

<u>A. hyrcanus</u> var. <u>sinensis</u>	66 percent
<u>A. hyrcanus</u> var. <u>nigerrimus</u>	0.8 "
<u>A. tessellatus</u>	3.3 "
<u>A. aconitus</u>	6.3 " (most widely spread in Tonkin)
<u>A. vagus</u>	2.2 "

The A. sinensis and A. vagus are found in the domestic ponds, ditches,

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swamps, edges of streams, and rivers, and the waters emerging from rice mills. A. aconitus are found in the ditches and swamps and on the edges of rivers and streams. It is important to realize that a vector in one locality of great importance may prove of no concern in other places. This is true of A. tessellatus in the Delta region. In a study of one area it was of no importance, but in another studied in the same year, it seemed to be the second most important vector. A. sinensis, because of its willingness to feed on animals, usually is not a dangerous vector, but in both epidemics studied near Hanoi, it was the vector apparently most responsible for the condition present.

An epidemic in one area of the province of Haiduong occurred during May, June and July, with its peak in June. There were 1,055 cases reported which were studied in May and June, and again in November when there was a secondary rise in the number of cases. The following percentages of three kinds of plasmodia were found:

	<u>May and June</u>	<u>November</u>
<u>Plasmodium vivax</u> . . .	61 percent	76 percent
<u>P. falciparum</u>	28 "	16 "
<u>P. malariae</u>	10 "	8 "

In a second area studied from October through March, 1,003 cases were recorded. Here the percentage of malignant malaria showed the highest incidence.

<u>Plasmodium vivax</u> . . .	46 "
<u>P. falciparum</u>	47 "
<u>P. malariae</u>	7 "

The examination of the mosquitoes involved showed the following number of positive vectors:

<u>A. hyrcanus</u> var. <u>sinensis</u> . . .	3.9 "
<u>A. tessellatus</u>	2.0 "
<u>A. hyrcanus</u> var. <u>nigerrimus</u> . .	1.4 "

A. minimus and A. jeyporiensis are important vectors in northern Indo-China, as they prefer man to animals. They breed in domestic ponds and in the brackish waters of the lowlands near the sea. Along the Mekong Valley of Upper Laos, the A. maculatus and A. culicifacies are the important malaria vectors. The most important vector in the foothills of Tonkin is the A. minimus.

In southern Indo-China, including particularly some of the areas in Cochin-China, the following Anopheles are important:

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A. vagus
A. hyrcanus var. sinensis
A. tessellatus
A. barbirostris

These mosquitoes bite dogs, pigs, and buffaloes, as well as humans, and thus are not as dangerous vectors as A. minimus, A. maculatus, and A. jeyporiensis which prefer human blood. During the dry season when the rivers become little streams, breeding of A. minimus and A. maculatus is favored, and the danger of contracting malaria in the foothills is increased.

Preventive measures against malaria are carried out by anti-malarial groups, one in the north working from the Pasteur Institute at Hanoi, and another in the south, working from the Pasteur Institute at Saigon. The report of their work for 1936 shows:

	<u>North</u>	<u>South</u>
Inspection tours	152	193
Epidemiological investi- gations	52	122
Blood and entomological investigations	No report	179

Examinations of 19,407 persons for enlarged spleens disclosed 5,805 cases of splenomegaly.

Antilarval measures, such as drainage, oiling, and spraying with Paris green, are carried on, also spraying and screening of buildings. Wherever possible, proper sites for labor camps, permanent industries, etc., are insisted upon. In certain instances, suppressive doses of anti-malarial drugs are given to special groups. In 1936 there were 52,423 cases of malaria admitted to hospitals. This represents 15.3 percent of the total admissions, which exceeds by 10 percent any other specific disease admitted to the hospital. There were 1,374 deaths caused by malaria or 16.3 percent of all hospital deaths. This exceeded by 10 percent any other cause of death except tuberculosis and pneumonia, which caused 8.5 percent and 6.7 percent of the deaths respectively.

Malaria Reported in the Government Hospitals in Indo-China

Year	Number of Cases	Rate per 1,000 cases in hospital	Deaths	Rate per 1,000 deaths in hospital
1924	26,700	151	1,100	104
1925	20,600	114	1,200	102
1926	20,700	110	1,300	102

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1927	18,800	87	1,400	52 (Cholera epidemic)
1928	23,400	111	2,100	157
1929	21,200	101	1,400	102

1934	25,413	105	1,271	88
1935	38,822	128	2,569	169
1936	52,423	153	2,374	163

The net increase of cases from 26,700 in 1924 to 52,423 in 1926 does not necessarily indicate an increase in the total number of cases of malaria, but rather an increase in the number of hospitals and the increasing willingness of the people to use the hospitals. The increase of deaths may be ascribed to the very sick people who are anxious to go to the hospitals rather than to a change in the virulence of the plasmodium of malaria. It may well be noted that in 1927 the marked decrease in rate of deaths from malaria to 52 is only a relative figure. At that time there was a very serious cholera epidemic which increased the annual total deaths far above normal. Maps 2-8 show the malarial distribution in the several states and provinces. The following general statements apply to these states:

Cochin-China: The forest provinces have become malarious by migration of infected people from the adjoining western sections. The central provinces which have the highest development of civilization have in general little or no infection. There may be outlying regions which have high rates.

Cambodia: The highlands covered with trees have high rates; the low countries with rice fields and steep river banks have lower rates.

Laos: Malaria is prevalent throughout, especially on the high plateaus (but not on the highest mountains), the Plateau of Bolovens, and the slopes of the Annamite Mountains.

Annam: All provinces within this state have a rather high incidence of malaria. Spleen rates are reported as being 80 to 100 percent. The state may be divided into two zones: the mountain section with a rather sparse population where malaria is endemic, infecting practically all the people; and the populous coastal zone with areas of epidemic proportions and other areas with little or no malaria.

Tonkin: The areas of heaviest incidence are found in the mountain provinces, particularly the foothills of the mountains. Malaria is often completely absent in some of the provinces of the Delta.

b. Blackwater Fever. This disease is rather severe in the upper regions of Laos, and is also seen from time to time in other parts of

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this state. It occurs rarely in the Delta of the Red River of Tonkin, but is found frequently along the upper reaches of the Black and Claire Rivers. Wherever all types of malaria are found, blackwater fever may develop. On the other hand, there are localities where the particular strain of Plasmodium is very prone to result in a large number of cases. These regions are very dangerous for foreign troops.

c. Enteric Diseases. It is a question in Indo-China whether venereal or intestinal diseases will cause the greatest trouble to troops, but during the "fly seasons" unless unusual precautions are taken, diarrhea and dysenteries are certain to prove very serious. The following table shows hospital admissions for intestinal infections for these years:

Intestinal Infections in Hospitals

Year :	Dysenteries								Typhoid				Cholera				
	Amebic				Bacillary												
	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate	Cases	Rate	Deaths	Rate	
1936	5,010	.15	135	9:991	3	162	11	:	947	3	186	13	:	8	-	8	1
1935	3,733	12	427	24:386	1	46	2	:	1,036	3	290	16	:	37	-	10	-
1934*	3,686	15	422	29:					:No special report				:	44	-	19	1

*Both amebic and bacillary. Rates per 1,000 cases of all sicknesses or deaths in hospitals

(1) Dysentery. -- (a) Amebic. From the above hospital reports, it would seem that amebic dysentery is much more important than bacillary. It is probable that the reverse is true, but due to two factors, the hospital records show a vastly greater number of amebic cases over bacillary cases. In the first place, amebic dysentery cases tend to be far more chronic, and the patient is worn down to the point where he will accept hospitalization, whereas the bacillary case is usually dead or much better before having recourse to hospital care. Finally, there is real doubt as to the accuracy of the diagnosis. The better the laboratory checking of dysentery cases, the higher the proportion of bacillary cases.

(b) Bacillary. Bacillary dysentery is very prevalent and may be a very serious disease for troops. The table above shows the number of cases recorded, which is far below the actual number. Flies, which, are very numerous from the last of March through November in the south, and until October in the north, spread much of the infection. Many villages have epidemics of dysentery during the rainy season. Many of the relapses and deaths are due to improper diet, a premature return to the usual diet of hard-cooked rice being almost certain to cause serious

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relapses. The total reported number of all dysenteries in the years 1935-38 is shown in Table 6.

(2) Cholera. (Map 9) Besides occasional cases of cholera occurring irregularly throughout Indo-China, there have been outbreaks of epidemic proportions. One million four thousand vaccinations were given in 1936 in the provinces along the Mekong River. Cholera outbreaks usually begin in March or April, lasting through the rainy season. In the case of an outbreak, a group of trained men is sent from the nearest Pasteur Institute with anticholera vaccine, and every road leading from this area is carefully guarded. No person is allowed to leave or enter the province without cholera inoculations. The population involved is urged in every way possible to take the vaccination. Education of the public by means of posters, lectures, and official orders is carried out. In this manner the epidemic is checked in rather short order. Having the personnel present and the necessary material under production is of great help to this Union.

Cholera Cases in Indo-China

1935	124	1937	11,858
1936	74	1938	8,507

The history of the spread of cholera in the states of Indo-China is indicative of the possible appearance of this disease in the future. In Cochinchina cholera is now endemic. It appears in the provinces along the Mekong River.

In Cambodia in 1912 cholera started in the provinces of Kamport, Kampong Cham, and Prey Veng. A special report on cholera claims that there continue to be 1,000 - 2,000 cases yearly from this state, though annual reports for the Union fail to show such cases.

In Laos in 1908 cholera first started in the provinces of Luang Prabang, Vientiana, and Savannakhet, spreading to these places from Annam. Difficulties of travel and the improvement of anticholera methods have resulted in practically no cholera now in this state.

In Annam in 1926 cholera crossed over from the province of Thanhhoa in Tonkin, during the worst recorded epidemic of cholera in Indo-China.

In Tonkin, since the epidemic of 1926 with over 30,000 deaths, much work has been done to prevent the disease. Anticholera vaccinations and education have resulted in cholera's practical disappearance from the native population.

A resume of the more important epidemics by states follows:

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Cholera Epidemics in Indo-China
by States

Year	Cochin-China	Annam	Tonkin	Cambodia	Laos
1908	2,000	2,524	-	-	1,500 d.
1911	5,940	-	-	-	-
1912	7,488	-	-	6,612 d.	2,000 d.
1915	3,807	-	2,500 d.	5,422 d.	-
1916	-	5,616	2,115 d.	-	-
1919	3,180	-	-	-	1,225
1926	-	4,000 d.	30,000d.	-	885 d.

d. = deaths
In Kouang Tcheou wan, 1937, 305 cases

(3) Diarrheas and dysenteries are reported, due to Giardia lamblia, Chilomastix mesnili Wenyon, Trichomonas hominis, and other flagellates.

d. Venereal Diseases.

Venereal Diseases in Hospitals in
Indo-China

	: Syphilis		: Gonorrhea		: Chancroid		: Totals			
	: Rate	:	: Rate	:	: Rate	:	: Rate			
	: per	:	: per	:	: per	:	Cases	Rate	Deaths	per
Year	: Cases	: 1,000	: Cases	: 1,000	: Cases	: 1,000	: Cases		*	1,000
	:	:	:	:	:	:	:			
1934	5,758	24	5,644	23	2,318	9	13,720	56	202	14
1935	8,943	30	11,746	39	2,685	9	25,371	78	188	11
1936	11,031	32	8,928	26	3,167	9	23,202	67	219	15

*Deaths due largely to syphilis.

Rates per 1,000 cases of all sickness in hospital and deaths per 1,000 of all deaths in hospital.

As in all parts of the world, syphilis, gonorrhea, and chancroid are present, and will be a constant source of menace. Lymphogranuloma inguinale or climatic bubo, and granuloma venereum also occur, but much less frequently than the other three.

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e. Plague. (Map 10). There are three endemic centers from which plague may spread: Cholon in Cochin-China, Phonm Penh in Cambodia, and the Territory of Kouang-Tcheou Wan, though the states containing these centers actually have a very small total number of cases. The following table is given to show the general trend of the disease.

Plague in Indo-China

<u>Year</u>	<u>Cases</u>		<u>Year</u>	<u>Cases</u>
1919	860		1926	240
1920	760		1927	260
1921	1,050		1928	180
1922	1,250		1929	150
1923	960		-----	-----
1924	870		1936	47
1925	800	<u>Year</u>	1937	19
		<u>Cases</u>		
		1942		81

This table shows a steady decrease, due to antiplague measures. No figures were available for the years 1938, 1939, 1940, 1941. Plague occurs chiefly from November through February, and is gone by May or June. Pneumonic or septicaemic cases have been recorded, but are rare. The common rat, Rattus rattus, is the chief reservoir of the plague bacillus, and the Oriental flea, Xenopsylla cheopis, is the vector. Rattus norvegicus is important in neighboring Thailand and may well be a factor in the spread of plague in the provinces along the Mekong Valley.

Antiplague vaccine was first developed by French doctors in Indo-China and is now used extensively with apparent benefit. Thirty-one thousand vaccinations were performed in 1936.

f. Diseases Due to Heat. Indo-China is in the tropics, and any condition caused by excessive heat will be found here. The natives, however, being dark-skinned, have become accustomed to the rays of the sun and are rarely troubled. From time to time individuals who have become somewhat civilized and live inside the house or wear headgear to protect them from the sun, may get "a touch of the sun" (that is, become sensitive to the sun's rays), and develop headaches when unduly exposed. Heat prostration or sunstroke is rarely if ever seen in the natives.

2. Diseases of Potential Military Importance.

a. Endemic Diseases. - (1) Dermatological Diseases. -- (a) Tropical ulcer, or ulcere phagedenique, is present throughout the Union. In 1936, 4,373 cases were reported by the Government, 15/1000 of all cases treated. There were 41 deaths.

(b) Scabies is found in all states, appearing most commonly among the hill tribes, who find bathing and washing of clothes difficult because of the scarcity of water.

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(c) Fungus infections are common in the Orient. Besides the infections due to the trichophyton and epidermophyton found most commonly around the genitalia, there are other fungi which cause dermatological conditions. Piedra, an infection of the hairs, is caused by P. hortai. Rhinosporidiosis, resulting in polypoid growths of the nose, ears, and lacrymal sac, is due to the fungus Rhinosporidium seeberi. This is found particularly in Cochin-China. Madura foot is also seen in Cochin-China. This is caused by various mycetoma fungi which usually invade the foot following a scratch or slight wound.

(2) Typhus Fever. All three types are found in Indo-China. Epidemic typhus is limited to outbreaks in the prisons. It was reported in Cochin-China in 1938. Scrub or mite typhus is most frequently encountered in the outlying regions. Undoubtedly, considerable undiagnosed typhus occurs throughout the Union. Cases reported by the Government are not classified according to types. In 1936, six cases were reported, and in 1942, eleven cases. Both figures obviously are under the actual number.

(3) Dengue Fever. This six-day fever characterized by a double paroxysm of fever and discomfort, is found throughout Indo-China. It was first recorded in 1890 at Haiphong and then at Hanoi and Saigon. As a vector of the disease, Stegomyia fasciatus, is ubiquitous in Indo-China, the possibility of the spread throughout the Union exists.

b. Diseases That Might Be Introduced from Other Regions.

(1) Yellow fever has never been reported, but its vector, Aedes aegypti, is present in Indo-China.

(2) It is uncertain whether or not sandfly fever now occurs, but sandflies exist.

(3) No reports of tick-bite fever (tick paralysis) as such have been recorded, but the ticks are present.

3. Diseases Likely to Affect Small Numbers of Troops. -- a. Rabies. This is frequent in dogs and pigs.

Rabies in Indo-China

1934-1936

<u>Year</u>	<u>Cases for Prophylactic Treatment</u>	<u>Deaths</u>
1934	100	41
1935	83	48
1936	833	35

In Saigon from 1891 to 1929, 9,000 people were given antirabic treatment. From 1920 to 1929, in all Indo-China, 15,000 cases were given antirabic treatment. In 1936, 8,777 doses of antirabic vaccine were prepared in the Pasteur Institutes.

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b. Relapsing Fever. Relapsing fever, caused by the Treponema recurrentis or Spirochaeta obermeieri is reported. The louse, Pediculus humanus, is suspected as the most common vector in Indo-China, ticks less frequently. The louse transmits the disease by being crushed, the infection then entering through a scratch or abrasion. Louse-borne relapsing fever is more often found in cold weather, and rarely in very small children; tick-borne relapsing fever is found more often in adult males and in the hot weather.

This disease appeared in Annam in 1906 and the next year in Tonkin. From 1906 to 1915 there were various numbers of cases, from 1,200 in one year to less than 100 in another year in Annam. After 1915 for a period of years there were no more cases in Annam. At Tonkin there were 800 to less than 100 cases each year until 1918 when the disease seemed to disappear for a time. In 1935 six cases were reported; in 1936, 133 cases; and in 1937 five cases.

c. Filariasis. This disease is caused by Wuchereria bancrofti and W. malayi. Mosquitoes, such as Culex fatigans, Anopheles hyrcanus, and certain Aedes, have been shown to be possible vectors as well as some of the Phlebotomi sandflies.

Forty percent of the people in the Tonkin Delta region are said to be infected with the Wuchereria bancrofti, though the upper valleys of the Red and Black Rivers are free from infection. The disease is also found in Annam and Cochin-China. W. malayi has been found to predominate in and about the Delta region of Tonkin.

d. Flukes. Clonorchis sinensis, or Chinese fluke infection, contracted through eating certain raw fresh water fish, is common on the east coast of Indo-China, one-half of the natives being reported as infected. The area of the delta of the Red River is also an infected section. This condition is diagnosed by the finding of small operculated eggs in the stool.

4. Diseases Causing High Morbidity or Mortality among the Native People.

a. Tuberculosis. As in all parts of the world, tuberculosis is present and important.

The annual death rates per 100,000 population of the three following large cities show the seriousness of the condition:

Tuberculosis in Indo-China

	Respira- tory	Other forms	Resp.	Other	Resp.	Other	Resp.	Other
	<u>1934</u>		<u>1935</u>		<u>1936</u>		<u>1937</u>	
Haiphong	205.8	-	192	13	158	24	233	30
Hanoi	25.4	20.9	104.4	4.6	140.8	3.8	178.7	2.2
Saigon (Cholon)	363.6	7.4	375.8	5.9	352.5	15.8	285.1	10.4

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B. C. G. vaccination has been extensively employed. In 1935, 45,000 persons were given it, and in 1936, 56,000 persons.

Considerable work is being done by the Pasteur Institute to combat tuberculosis among cattle. Of 18,302 cattle tested in 1938 in Cambodia, 47 cases of tuberculosis were found, a rate of 2.6 per 1,000.

b. Leprosy. Indo-China is in the leprous black-belt of the world. The number of lepers reported for 1938 was 4,057; in 1936, 4,071; in 1935, 4,057. There are fourteen leper asylums or agricultural colonies, and 170 other places where lepers are treated. The estimate of 15,000 lepers in the Union, an incidence of 65 per 100,000 population, is perhaps within one-half or one-third of the actual number. Certain sections allow two years of home isolation with dispensary treatment before sending the leper to a colony, but this does not prove satisfactory.

c. Beri-beri or Bouffissure d'Annam is a very common disease in Indo-China, appearing most frequently in Cochin-China with an incidence of eight cases per 1,000 population. It appears most frequently in the 20 to 45 year age group. Some of the local French doctors still claim a bacillary cause for this condition, ascribing it to "B. asterogenes". The distribution of reported beri-beri in the states is shown in a 1929 report.

Beri-Beri in Indo-China

<u>State</u>	<u>No. of Cases</u>	<u>Deaths</u>
Cochin-China	3,601	424
Tonkin	135	66
Cambodia	93	40
Annam	33	9
Laos	9	1
	<u>3,871</u>	<u>540</u>

Hospital Cases of Beri-Beri in Indo-China

<u>Year</u>	<u>Cases</u>	<u>Rate*</u>	<u>Deaths</u>	<u>Rate*</u>
1935	4,695	16	427	24
1936	6,471	19	288	20

* Rates per 1,000 cases or deaths in hospitals.

d. Intestinal Parasitism. Intestinal worms are frequent; in fact many people harbor two, three, or four different kinds. In a study of 1,250 persons, worms were found in the following percentages:

Trichocephalus trichiurus	77 percent
Ascaris	71 "
Ancylostoma	50 "
Clonorchis sinensis	27 "
Taenias	2.5 "

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Both kinds of hookworm, New and Old World, Necator americanus and Ancylostoma duodenale, are found.

Of the tapeworms, the Taenia saginatum or beef tapeworm is the type usually found, but Taenia solium or pig tapeworm is also present.

Oxyuris vermicularis or pinworm is present but rare - a surprising condition, considering the ease of spread and autoinoculation.

e. Trachoma is very common. It has been treated by the French by operations on the lids. In 1935 there were 6,942 cases treated. Inasmuch as trachoma cases come to the hospital only if very serious, and as they are rarely completely cured by surgery, one can assume a large number of cases of trachoma throughout the Union. It is reported that there are some 5,000,000 of the inhabitants of Indo-China affected. In Phnom Penh in Cambodia 43 percent of the school children have been reported to be suffering from the disease.

f. Typhoid Fever. The table on page 12 shows the number of cases of typhoid as compared to dysentery. Although typhoid fever is not the serious disease it used to be for troops, it is still very prevalent among the native populations. A large proportion of the adults over 40 years of age have had typhoid. Antityphoid vaccine is produced by the Pasteur Institute and used wherever possible. The reported cases for the Union in the years 1935-1938 are shown in Table 6.

In Tonkin, typhoid appears more frequently from October to April. The mortality is greatest in July. In Saigon and Cholon, it follows the curve of the dysenteries during the rains from July to the end of October. The age group in which typhoid is most prevalent is 20 to 35 years.

g. Smallpox.

Smallpox in Indo-China 1934-1936

<u>Year</u>	<u>Hospital Cases</u>				<u>All Cases Reported</u>	
	<u>Cases</u>	<u>Rate</u>	<u>Deaths</u>	<u>Rate</u>	<u>Year</u>	<u>Cases</u>
1934	687	5	239	17	-	-
1935	475	2	140	8	1935	3,655
1936	135	-	90	6	1936	1,872
					1937	3,053
					1938	7,043
					1942	3,729

Reports for 1939-41
not available

For 1943 through February, 718 cases of smallpox were reported in Cochín-China and 405 in Tonkin.

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h. Pneumonia.

<u>Hospital Cases of Pneumonia in Indo-China</u>				
<u>Year</u>	<u>Cases</u>	<u>Rate per</u> <u>1,000</u>	<u>Deaths</u>	<u>Rate per</u> <u>1,000</u>
1935	2,410	8	232	15
1936	2,508	7	972	67

Pneumonia, as in other countries, is most frequent during the cold seasons. The types of pneumococci are the same as elsewhere in the world. Much of the pneumonia seen in Indo-China has a shorter period of acute illness than usually encountered.

1. Yaws. In 1935, 1,246 cases of yaws were admitted to the hospital (four out of every thousand admissions). In 1937 in all Indo-China 97,442 cases were reported. As a rule, the cases do not report to the hospital, and as they respond to a specific treatment, are easily handled. Map 11 shows the chief distribution of yaws in the Union.

5. Miscellaneous Diseases. -- a. Intoxication. -- (1) Alcoholism. Alcohol is made from rice, and three accepted strengths are recognized by the Government: 35 percent, 40 percent, and 75 percent. Special permits are required to obtain the latter. Alcoholism, though not a serious problem, according to the Director of Insane Institutions, is a rising menace. The condition is seen most in Cochinchina, where some 10 million liters of alcohol are made in one year to meet the needs of about 4,000,000 people. European liquors are not consumed by the natives to a large extent because of their prices.

(2) Opium. The smoking of opium is common throughout Indo-China, particularly in Cambodia and Laos. The Annamites smoke more in the Delta region than do the natives in the jungle section. Studies show the following proportion of different races who use opium:

Chinese	50 to 70 percent
Annamites	20 to 40 percent
Muonges	40 percent
Thos	35 percent
Muns	30 percent
Meos	20 percent

(3) A few cases of cocaine addiction. There are no reports of marihuana habitues.

b. Anthrax has been reported from all parts of the Union, but appears most frequently in southern Annam, causing from 40 to 96 deaths a year.

c. Tetanus appears rather commonly in the Union. In 1934 there were 291 cases with 172 deaths.

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d. Sparganosis. This is an infestation of the muscles and tissues of the body by Sparganum mansonii, the plerocercoid larval form of Diphyllbothrium tapeworm, which normally is found in the dog, cat, wolf, leopard, and tiger. The intermediate hosts are the cyclops and the frog or snake. Infection with the sparganum may take place through drinking water contaminated with infected cyclops, but usually occurs through the native custom of applying split live frogs as a dressing or poultice to sores on the hands, female genitals or eyes. The parasites migrate from the frog tissue directly into the human. A great deal of eye disease thus results around the Tonkin Delta. The parasites may settle in the lids or orbital fat (not in the globe of the eye), or towards the face, temple, root of nose, or cheek. This is followed by pain, redness and edema.

e. Fasciolopsis buski infection has been reported from Cochin-China and undoubtedly is in Tonkin as well. The inland sections of the Union are probably not infected.

f. Melioidosis, the "glanders-like disease of Rangoon" is caused by the Malleomyces pseudomallei (Bacillus whitmorei), and has been reported chiefly from Cochin-China. The reservoir is in the rat. The disease resembles cholera or plague, and the patient usually dies within ten days. As the condition continues for three or four days it may resemble malaria or typhoid fever. Diagnosis is made by bacterial examination. Prevention is through special care of food which is likely to be contaminated with the urine or faeces of rats.

g. Kala-azar (visceral leishmaniasis) is rare, the few cases occurring chiefly in foreigners.

h. Cerebrospinal meningitis and acute poliomyelitis appear in the different hospitals of the states every year. It occurs most frequently in Tonkin, with the next highest incidence in Cochin-China. In the entire Union in 1920 there were 160 cases; 1925, 125 cases; 1929, 55 cases. In 1935 acute poliomyelitis occurred in epidemic proportions, 248 cases being recorded. Since then 40, 40, and 30 cases were reported for 1936, 1937, and 1938.

i. Measles (all types), mumps, whooping cough and chickenpox are present throughout the Union, occurring in epidemics every few years.

Measles Cases Reported in Indo-China 1935-1938

1935 . . . 3,870	1937 . . . 3,321
1936 . . . 2,457	1938 . . . 1,510

j. Scarlet fever occurs from year to year but is very mild; it never appears in large epidemics.

k. Diphtheria has never yet developed into a serious epidemic. It is found chiefly in Tonkin and Cochin-China. In 1920 there were 25 cases, and

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in 1925 30 cases were reported. No doubt there are many mild unrecognized cases. Immunization is practiced. Table 6 shows the number of cases for 1935-1938. Diphtheria is reported to be more common in Europeans living in Indo-China than it is in the native population.

1. Goiter is seen in various sections among the native population, particularly in the mountains where the iodine content of the soil and water is low and 20 to 80 percent of the natives show goiters.

m. Sprue. Indo-China has a high proportion of such cases, developing in those who have come from Europe.

6. Diseases Which May Occur But Which Have Not Been Recognized.

a. Cutaneous leishmaniasis, found in the dogs of Tonkin, may be the cause of some of the ulcers so common in Indo-China. It is spread by the Phlebotomus or sandfly.

b. Psittacosis. No reports of this disease have been made, but epidemiological studies show that it very likely may be found among the wild parrots, parrakeets, and pigeons.

Summary

Public Health Department. The health department of Indo-China has been well organized and reaches out to the outlying posts in all areas through the capitals of the provinces (comparable to the counties in the United States). Its weakest point is that many of the officials are poorly trained and much of its routine was and is performed in a perfunctory manner. Reports are unreliable, and do not follow the same form from year to year, thus making comparisons and conclusions difficult. On the other hand, a good organization has been set up to combat epidemics of cholera or plague, and considerable work is being done against malaria.

The hospitals in the larger centers are adequate and well equipped. They could not, however, be counted on for the use of an invading army, as they would not be adequate for both military and native population, and much of the material would be destroyed by the retreating forces. It will thus be necessary for any troops entering Indo-China to carry with them full medical equipment and a supply of drugs.

The water supply in large centers is potable, but the usual sources for troops will have to be treated, as the native population through the outlying regions is accustomed to using streams or the edges of them for toilet purposes. Sewage in the same way must be cared for by the troops themselves, since no adequate sewage disposal systems exist.

The food supply, except for rice, is inadequate. If the crops have not been destroyed, an ample supply of rice should be available for rather large numbers of troops. Vegetables and fruits might be purchased in small amounts but never in adequate supplies.

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Malaria is present in all its forms, and can be a serious cause of total disability. The dysenteries are very common, as are venereal diseases (syphilis, gonorrhea, soft chancre, lymphogranuloma inguinale, and granuloma venereum). Skin diseases, as tropical ulcer, scabies, and various fungus infections, may be expected, as they occur throughout the Union. The respiratory diseases will cause a great deal of trouble during the cold season. Typhus, particularly the scrub type, may show up among the troops. Dengue is present, and may be troublesome under certain exceptional conditions. Rabies, trachoma, beriberi, anthrax and melioidosis might occur, as they are found in the country.

Mosquitoes - anopheles, aedes, and culex - are found all through the country. Leeches are troublesome in the rainy season, as are flies in the lowlands at all times and in the upper lands during the hot and rainy seasons. Poisonous snakes, scorpions, centipedes, and wild animals are common, but should cause little concern to the troops as a whole.

Recommendations. Besides the usual procedures carried out for troops wherever they are, the following specific precautions are advised:

1. The water supply everywhere should be considered unsafe for drinking purposes unless boiled or chlorinated.
2. Mosquito control should be considered the major sanitary problem and the following precautions observed:
 - a. Issue of mosquito bars before arrival.
 - b. Issue of insect repellents before arrival.
 - c. Use of head nets and gloves and of high boots or leggins to prevent any possible biting of the ankles. Troops on the move are more apt to contract malaria by bites around the ankles than on the face and hands.
 - d. Screening of all quarters including, if possible, a double entrance or vestibule with screens on both outer and inner doors.
 - e. Spray killing of mosquitoes in buildings. The spraying should be done at dusk and again at bed time if there is any question of mosquitoes having entered the place. The Freon-aerosol insecticide cylinder is particularly suitable.
 - f. Careful selection of camp sites, at least a mile from native houses on a high plot of ground suitable for drainage.
 - g. Control of breeding areas.
 - h. A well-directed and continued educational program toward the danger and destruction of flies and mosquitoes.

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3. Flies. The menace of dysentery and of diarrheas is in proportion to the menace of flies. Every known method must be used to get rid of the flies.

- a. Screening and use of sprays to kill the flies are indicated.
- b. Sticky flypaper, if available, should be used.
- c. Garbage and refuse of all kinds must be adequately protected from flies. No breeding places should be allowed.
- d. Toilet facilities must be fly-proof.

4. Venereal disease is an even greater menace in these countries than in more civilized parts. There are none of the normal forms or recreation available to the troops, and the language of the people is difficult for the soldier to handle if he can speak it at all. Boredom will result unless great pains are taken to overcome it. Plenty of reading material should be supplied. A recreation center that is active and planned to serve the largest possible number should be of prime importance. Prophylaxis stations should be provided and individual prophylactic kits made available.

5. Rodent Control. Plague is present every year in this country. Permanent, and so far as possible semipermanent buildings should be made rat-proof, and extermination procedures instituted promptly.

6. Dermatological Disorders. Many of the sores developing are due to insect bites. Troops should be cautioned as the potential seriousness of sores caused by insect or leech bites, and should be instructed to obtain first aid for them.

Fungus infections can be expected and may constitute a serious problem. Foot powder should be used routinely. The same powder is excellent for "heat rashes" under the armpits or in the crotch. If used freely morning and night and perhaps during the day, 90 percent of fungus infections will be kept at a subclinical level. Frequent bathing is indicated.

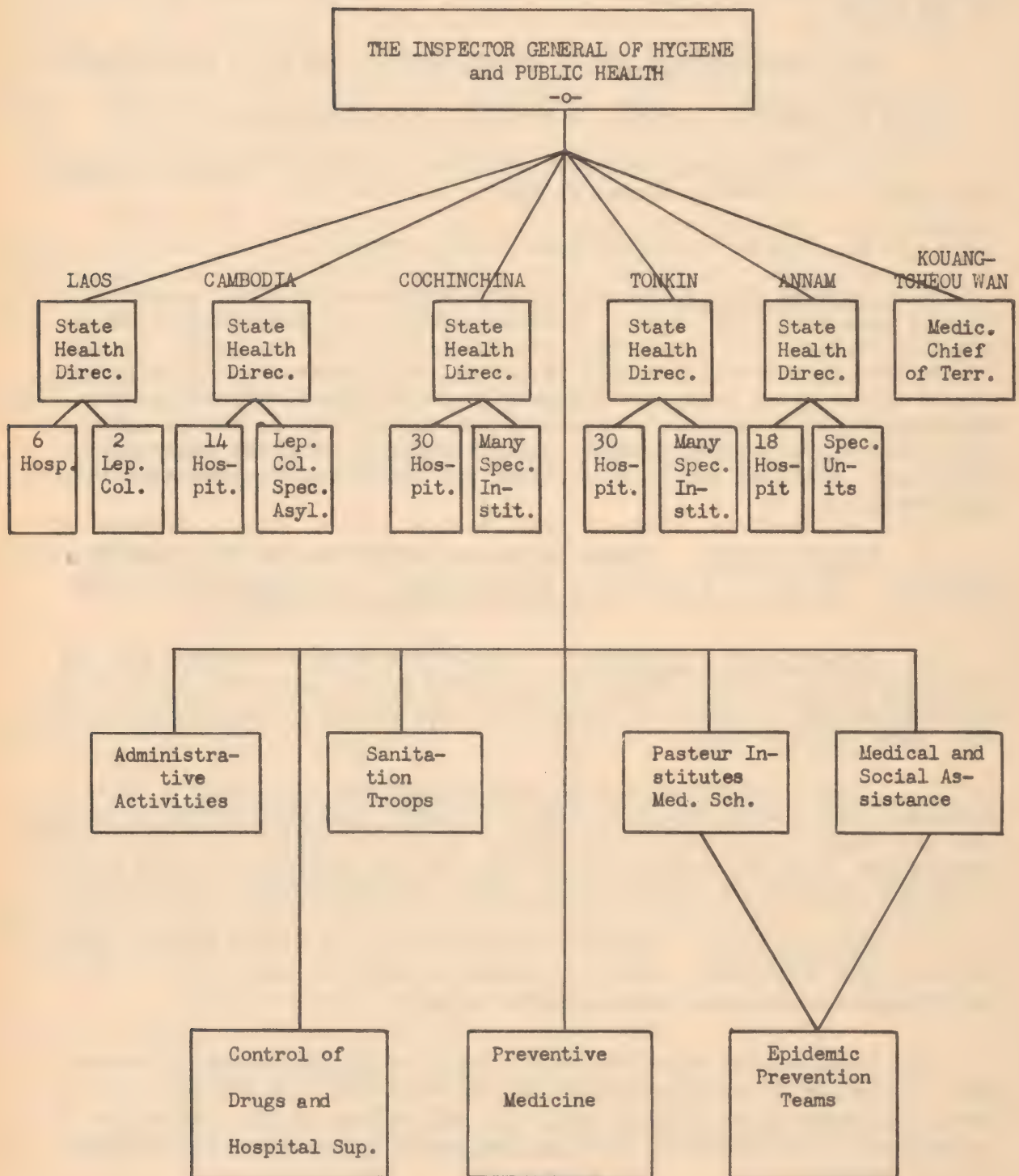
7. Heat Injuries. Special precautions will be needed in many areas to avoid heat injuries. Attention should be paid the salt intake. Protective helmets and sun glasses may be needed.

8. Local eating establishments should not be patronized in general. Even in the few to which patronage may be permitted, the eating of raw fruits and vegetables is dangerous. If soft drinks of the country are to be consumed, they should be kept for two weeks before being distributed to the troops.

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PUBLIC HEALTH ORGANIZATION OF INDO-CHINA



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TABLE 1

French Indo China

Medical Budget of Health Department

<u>Year</u>	<u>Total for Medical Work (Piasters)</u>	<u>Percentage of Total Budget</u>
1922	3,500,000	2 percent
1923	4,500,000	3 percent
1924	5,200,000	4 percent
1925	5,200,000	4 percent
1926	5,200,000	4 percent
1927	5,800,000	4 percent
1928	7,000,000	4 percent
1929	7,500,000	4 percent
1930	8,200,000	4 percent
1931	9,200,000	5 percent
1932	8,000,000	5 percent
1933	7,900,000	6 percent
1934	7,500,000	7 percent
1935	7,250,000	7 percent
1936	7,500,000	7 percent
1937	8,000,000	7 percent

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TABLE 2

Births and Deaths in
French Indo-China for 1935

Province	Population	Births		Deaths	
		Number	Rate per 1,000	Number	Rate per 1,000
Cochin-China	4,664,518	155,294	33	114,684	25
Cambodia	2,697,800	41,173	15	22,970	8.5
Annam	5,507,800	127,905	23 .	81,704	14.8
Tonkin	8,843,734	271,317	30.7	133,977	15.2
Laos	991,117	21,688	21.8	18,166	18.
Kouang-Tcheou Wan	192,776	no statistics			
Totals	22,897,745	617,377		371,501	

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TABLE 3

Hospitals and Other Medical
Institutions of the States
of Indo-China-----1937

(Area, Population, and Number of Provinces)

<u>State</u>	<u>Area</u> <u>Sq. Km.</u>	<u>Population</u>	<u>Provinces</u>	<u>Hospitals</u>	<u>Other *</u> <u>Institu-</u> <u>tions</u>
Cochin-China	64,700	4,616,000	21	34	180
Cambodia	181,000	3,046,000	14	14	61
Laos	231,400	1,012,000	5	6	47
Annam	147,600	5,656,000	16	18	122
Tonkin	116,700	8,700,000	27	30	299

* This heading includes certain medical institutions not included in Table 4 as hospitals or dispensaries.

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TABLE 4
French Indo-China

Ten-Year Period of Hospital Work

<u>Year</u>	<u>Hospitals and Dispensaries</u>	<u>Hospital Cases</u>	<u>Dispensary and Hospital Treat- ments</u>
1928	480	550,000	2,500,000
1929	480	550,000	2,750,000
1930	540	600,000	3,050,000
1931	540	620,000	3,800,000
1932	560	550,000	4,000,000
1933	690	550,000	4,400,000
1934	690	620,000	4,800,000
1935	695	720,000	5,450,000
1936	680	740,000	5,900,000
1937	700	830,000	6,000,000

TABLE 5

French Indo-China

Distribution of Medical Personnel in the Different

States of the Union1937

	Doctors		Infirmiers or Compounders	Mid- wives	Others
	European	Indo- Chinese			
Tonkin	21	61	484	837	497
Annam	19	37	510	37	339
Cochin-China	95	102	344	197	51
Cambodia	13	31	213	103	-
Laos	9	14	181	11	6
	157	245	1,732	1,185	893

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TABLE 6

French Indo-China

Reported Cases of Certain Diseases

	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>
Cholera	124	74	11,858	8,507
Plague	19	47	19	4
Smallpox	3,655	1,872	3,053	7,043
Typhus Tropicale . .	2	12	52	4
Typhoid	923	910	1,279	1,136
Relapsing fever . .	6	133	5	1
Measles	3,870	2,457	3,321	1,310
Scarlet fever . . .	2	59	9	4
Diphtheria	147 24 d.	150 25 d.	123 10 d.	176 24 d.
Dysentery	17,759	19,227	15,355	14,475
Acute Poliomyelitis	248	87	12	5
Cerebrospinal meningitis	20	40	40	30

d. = deaths

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INFORMATION OF INTEREST

The history and prewar status of medical and public health services in Indo-China are best described in the official report to the Intergovernmental Conference of Far Eastern Countries on Rural Hygiene. In a report by Dr. P. M. Dorolle, Senior Medical Officer, the following comments were made:

"At the beginning of the nineteenth century, long before the arrival of the French in the country, a great emperor of Annam, Gia Long, laid the foundations of an Assistance Service, comprising provincial doctors ranking as mandarins, homes for the sick and indigent, and leper villages. In the south of the territory, Jayavarman VII, the great king of Cambodia who built the Bayon at Angkor, had, as far back as the twelfth century, founded over a hundred hospitals in connection with monasteries throughout the Khmer empire, which extended from Laos to lower Cochin-China.

"These enlightened attempts, however, failed to survive the upheavals, invasions and revolts to which the country was later exposed, and it was not until the French occupation, in 1862 in Cochin-China, and in 1897 in Annam-Tonkin, that the first institutions for medical care were opened to the natives of the country. After a period of organization, all the credit of which belongs to the Colonial Army Medical Corps, the Medical Assistance Service was officially created in 1905, and took over the hospitals and field ambulances founded by the civil and military authorities and by private initiative.

"In 1931, the military and civil health services which previously had been under the authority of a single Inspector-General were separated..
.....

"The staff of the Medical Service provide medical attention and at the same time are responsible for general health work. This combination of the two classes of work in a single service.....has had to be retained..
.....

"Traditional medicine is a factor which cannot be neglected in any programme of medical care. It derives from two sources, which, though differing in importance, are by no means unrelated: the Cambodian system of traditional medicine and the Sino-Annamite system. Cambodian medicine combines a jumble of magic incantations and witchcraft practices with a large number of formulae making use of local plants. The Kruv or Cambodian doctors, for example, have for centuries handed down by oral tradition knowledge of the action of chaulmoogra in the treatment of leprosy and even use the Krabao variety.... with which we are familiar today. Sino-Annamite medicine, which is practiced among a much larger population....derives from Chinese medicine, whose forms, modes of preparation and drugs and remedies it has adopted with local

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modifications.... Side by side with this traditional medicine as practised by the Annamite doctors, there is also Chinese medicine proper, frequently modernized in its **externals**. In one or other of these forms, traditional medicine retains the confidence of the vast majority of the population in spite of the inefficiency and blunders of certain more or less amateurish medicasters. There exist in the country thousands of modest booths of old-style practitioners and noisy shops of the patent-medicine sellers, who have no qualms about adding to their own products Western remedies more or less transformed and adapted to the tastes and purses of their customers. The latter, in spite of their attachment to the traditional medicine, are not unaware of its shortcomings and resort to Western methods when local forms of treatment fail. Even so, the medicaments imported from China and cleared through the Customs represent an annual value of several millions of francs. Those obtained and prepared locally may be estimated at a much higher figure."

--- * * * ---

The typical Annamese diet is similar to that of Thailand and Burma in that it consists chiefly of rice, with fish as the chief side dish, while considerable emphasis is placed upon nuoc mam, a fish paste disagreeable to European sensibilities. A great number of other foods are eaten when available, but it is difficult to estimate their individual importance. Among the 58 pamphlets on Indochina prepared by the Government for the International Colonial Exposition, Paris, 1931, is an interesting one by J. Guillerm -- "L'Industrie du Nuoc-Mam en Indochine", part of which reads in translation as follows:

"Nuoc-mam, a truly national food of the Annamese, supports an important Indochinese pickling industry.....

"The Technique of Pickling.... the technique of manufacture is the same throughout Indochina and may be summarized as follows:

- "1. A mixture of fish and salt, varying in different parts of the country, is placed in a vat.
- "2. A brief maceration period, under pressure, for about three days, provides a primary liquid more or less limpid, called nuoc-bai, which is removed from the vat.
- "3. Maceration (soaking) of varied duration, according to the variety of fish and the region, which is suitable for 'nuoc-nhut'.
- "4. Repeated draining of the vat by washings. These washings are effected with the aid of brine, or better, with the aid of weak liquid from other vats in process of manufacture.

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"5. Removal of the by-products (remaining fish).

"When ca-moi is utilized the oil constitutes an important by-product which is collected either from the faucet of the vat, or by skimming off the top during the course of preparation."

Writing on more general aspects of the Indochinese diet, M. Guillerm goes on to state:

"The protein portion of the diet, relatively small, is usually furnished by meats (pork and especially fish) or by vegetables. Also to relieve the monotony of the diet, the culinary art is ingenious and made more palatable by sauces and spices. These sauces utilize various bases, including albuminoids, salt and sometimes sugar."

The annamese cuisine somewhat resembles that of Southern China, and American repatriates on the Gripsholm have stated that whereas their menus, while under detention by the Japanese, called for Chinese "chow" once a week, they actually received, instead, an Annamese meal.

The heavy consumption of fish is shown by the estimate of 350,000 metric tons of annual production, and exports of but 34,000 metric tons. Exports consisted of fresh, salted, smoked and dried fish, chiefly sent from Cambodia to Thailand. Since Thailand now has a frontage on the shores of the Great Lake and around 30 percent of Indochina's production was from that Lake, it may be assumed that exports to Thailand have practically ceased.

Health authorities have reported a quantitative deficiency in food among the Annamese and have said that "the most common deficiency disease, and the only one of general importance, is beri beri." 1/ In a sense this situation would appear to simplify the problem of postwar relief administrators, in that shipment to the affected areas of sufficient quantities of rice would just about restore the native diet to "normal", without the administrative and other inconveniences which would be involved in importing a complete and balanced diet. Vegetables, fish and forest areas from which supplements to the rice diet may be secured free of charge are fairly widespread in the less densely populated areas, even during periods of food scarcity. Moreover, the fact that the cultivation of rice is as widely distributed throughout the country as is the fishing industry suggests an unusual ability of most Indochinese to provide themselves with a minimum of food in spite of adverse conditions.

Prewar sugar production consisted of about 22,000 metric tons of refined sugar and 60,000 metric tons of brown sugar. Wartime dislocations may cut down the production of refined sugar, but brown sugar nearly sufficient for local needs may continue to be produced in spite of war's

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exigencies. Imports of sugar, confections, etc., totaled about 2,000 metric tons in 1939.

There was a large production of eggs, but the volume is not known. Exports in 1940 were 15,100 metric tons -- probably a small part of total production. Production of peanuts was formerly approximately 12,000 metric tons, but expansion under Japanese occupation has doubtless increased output considerably. Most of the increase, however, is devoted to the production of motor fuel. It should be noted that after reoccupation it may be possible to use this increased supply of peanuts for food, if motor fuel is otherwise provided. Considerable meat is consumed and the export of live animals, chiefly pigs and water buffaloes, in 1940, approximated 8,500 metric tons -- an amount which, like the export of eggs, probably represented but a small part of total production. All the common Oriental types of fruit are grown in considerable quantities. 2/ Chinese cabbage, bean sprouts, yams and sweet potatoes were grown in most parts of the country, in quantities which seem to have suffices for local consumption, although a dietician would probably have suggested the use of a larger proportion of these vegetables in the native diet.

1/ Inter-Governmental Conference of Far Eastern Countries on Rural Hygiene, published by the League of Nations, Geneva -- 1937.

2/ "La plupart des fruits tropicaux (bananas, ananas, goyaves, letchis, oranges, pamplemousses) sont cultivés dans toute l'Indochine, certains (mangues, mangoustans) dans le Sud seulement. Des conserves d'ananas en vue de l'exportation sont fabriquées en particulier en Cochinchine". Papers on Indochina prepared for the Tenth Congress of the Far Eastern Association of Tropical Medicine, Hanoi, November 1938.

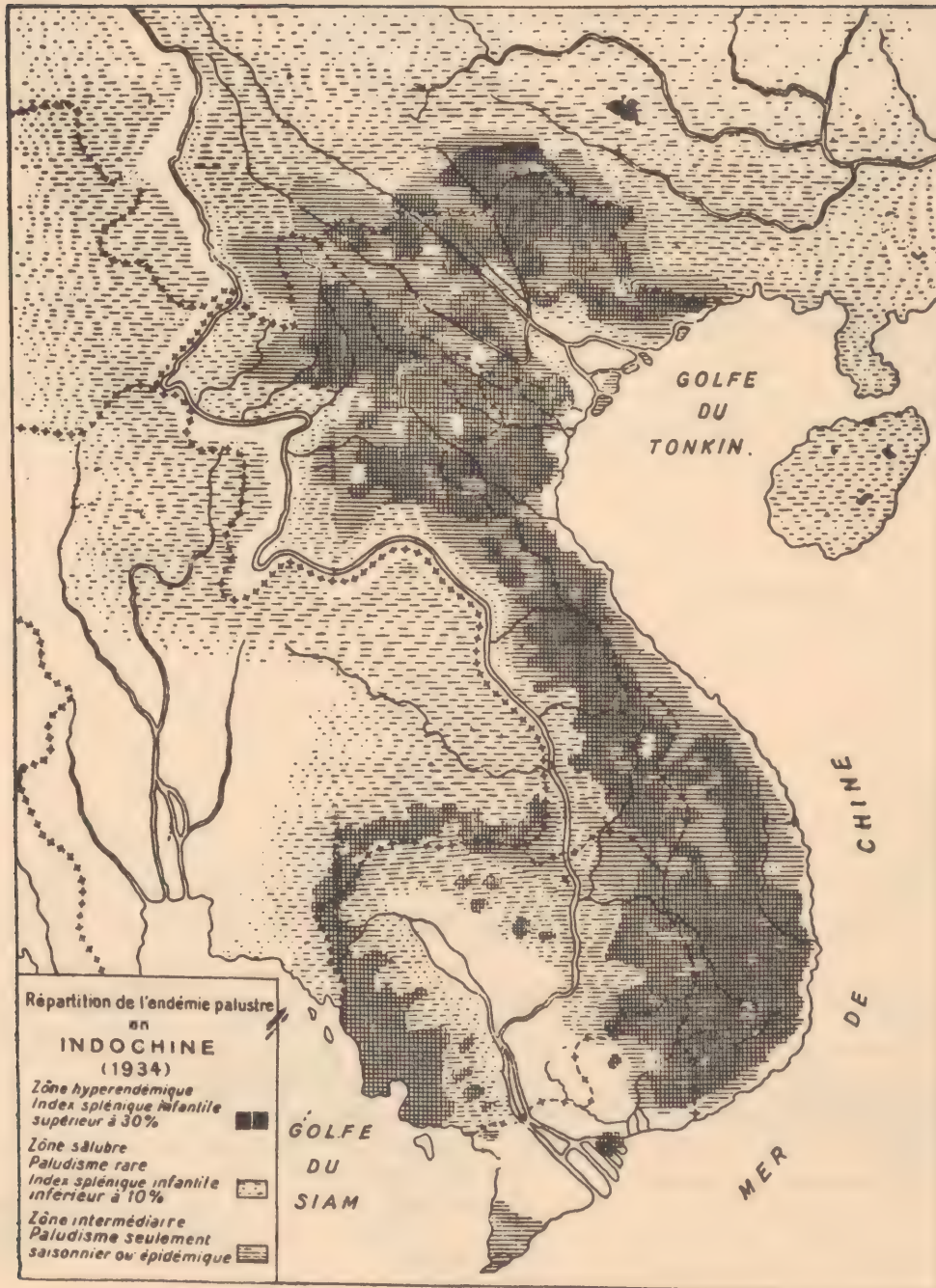
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MAP #2



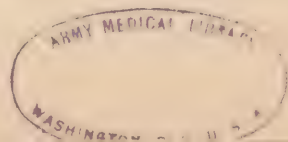
Distribution of endemic malaria in Indo-China.

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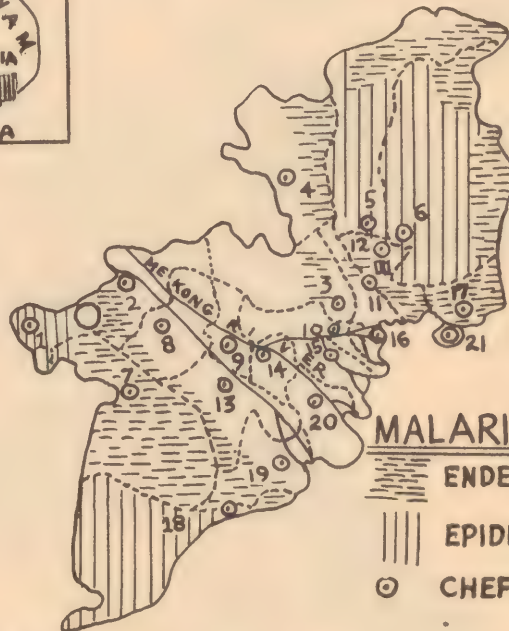
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MAP NO. 4

CHIEFS - LIEUX AND PROVINCES OF COCHINCHINA



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MALARIA DISTRIBUTION

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- ▨▨▨ EPIDEMIC MALARIA
- ⊙ CHIEFS - LIEUX

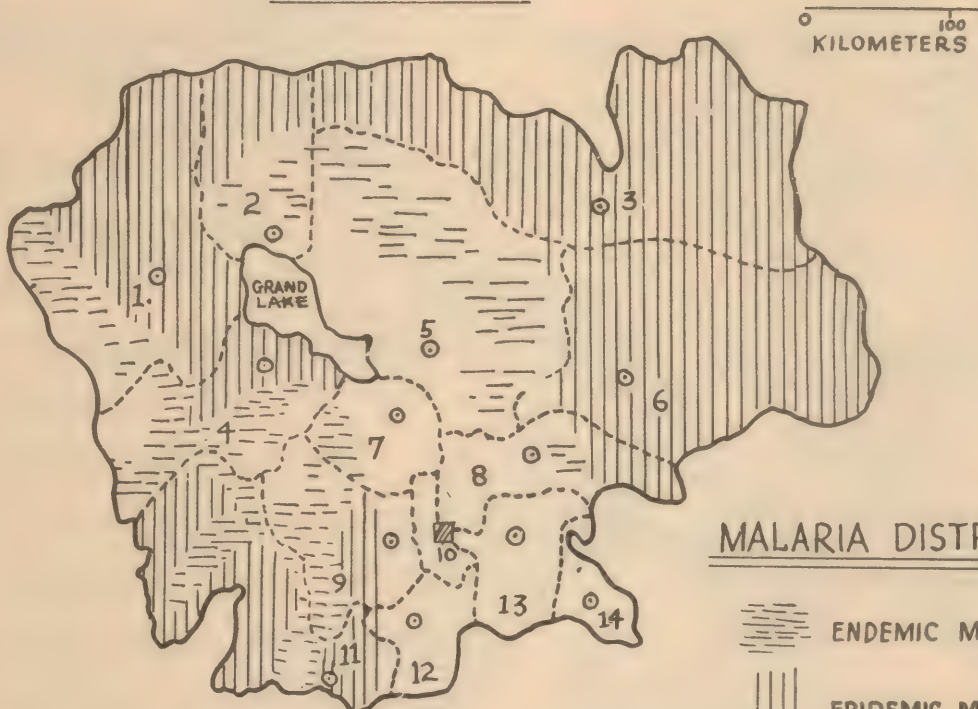
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| 2. CHAU DOC | 13. GANTHO |
| 3. TAN AN | 14. VINH LONG |
| 4. TAY NINH | 15. BEN TRE |
| 5. THU DAU MOT | 16. GO CONG |
| 6. BIEH HOA | 17. BARIA |
| 7. TACH GIA | 18. BAC LIEU |
| 8. LONG XUYEN | 19. SOCTRANG |
| 9. SADEC | 20. TRAVINN |
| 10. MYTHO | 21. CAP ST. JACQUES |
| 11. CHOLON | |

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CHEFS-LIEUX AND PROVINCES OF CAMBODIA

MAP NO. 5



MALARIA DISTRIBUTION

- ENDEMIC MALARIA
||| EPIDEMIC MALARIA
● CHEFS-LIEUX

- | | |
|--------------------|----------------|
| 1. BATTAMBANG | 13. PREI VENG |
| 2. SIEMREAP | 14. SOAI REING |
| 3. STUNG-TRENG | |
| 4. PURSAT | |
| 5. KOMPONG THOM | |
| 6. KRATIE | |
| 7. KOMPONG CHHNANG | |
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| 10. PHNOM PENH | |
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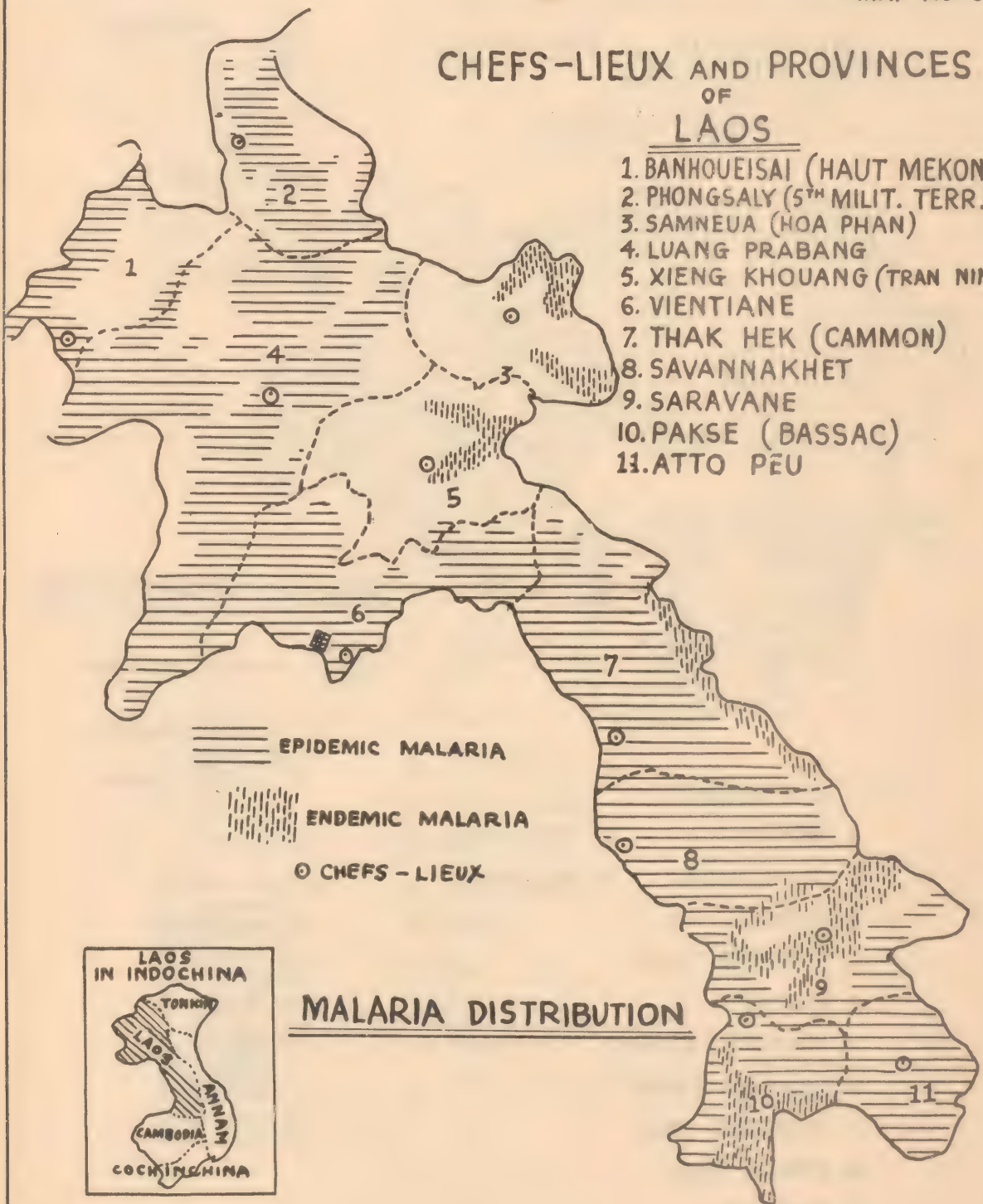


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MAP NO. 6

CHEFS-LIEUX AND PROVINCES OF LAOS

1. BANHQUEISAI (HAUT MEKONG)
2. PHONGSALY (5TH MILIT. TERR.)
3. SAMNEUA (HOA PHAN)
4. LUANG PRABANG
5. XIENG KHOUANG (TRAN NINH)
6. VIENTIANE
7. THAK HEK (CAMMON)
8. SAVANNAKHET
9. SARAVANE
10. PAKSE (BASSAC)
11. ATTO PEU



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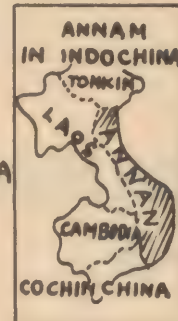
MAP NO.7

CHEFS-LIEUX AND PROVINCES OF ANNAM

||||| ENDEMIC MALARIA

==== EPIDEMIC MALARIA

○ CHEFS-LIEUX



1. THANH HOE
2. VINH (NGHE)
3. HA TINH
4. DONG HOC (TUNG-BINH)
5. QUANG TRI
6. HUE (THUA THEIN)
7. FAI FO (QUANG NAN)
8. QUANG NGAO
9. QUI NHON (BINH DINH)
10. SONG CAU (PHA YEN)
11. NHA TRANG (KHANH HOA)
12. PHA RANG
13. KONTOUM
14. BANMETHOUT (DARLAC)
15. DALAT (HAUT DONNAI)
16. PHAN TIET (BINH THUAN)

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CHIEFS-LIEUX AND PROVINCES OF TONKIN

MAP NO. 8

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1. LAICHAU (4TH MILIT. TERR.)
2. LAOKAY
3. HAGIANG (3RD MILIT. TERR.)
4. CAO BANG (2ND MILIT. TERR.)
5. SON LA
6. YEN BAY
7. TUNYEN QUANG
8. BAC KAN
9. PHU THO
10. VIPH YEN
11. THAI NGU YEN
12. LANG SON
13. HOA BINH
14. SON TAY

15. PHUE YEN
16. BAC NINH
17. PHU LONG THUONG (BAC GIANG)
18. MON CAY (1ST MILIT. TERR.)
19. HADONG
20. HUNG YEN
21. HAI DUONG

22. KIEN AN
23. QUANG YEN
24. HA NAM
25. NINH BINH
26. NAM DINH
27. THAI BINH

○ CHEFS-LIEUX

▨ ENDEMIC MALARIA

▨ EPIDEMIC MALARIA

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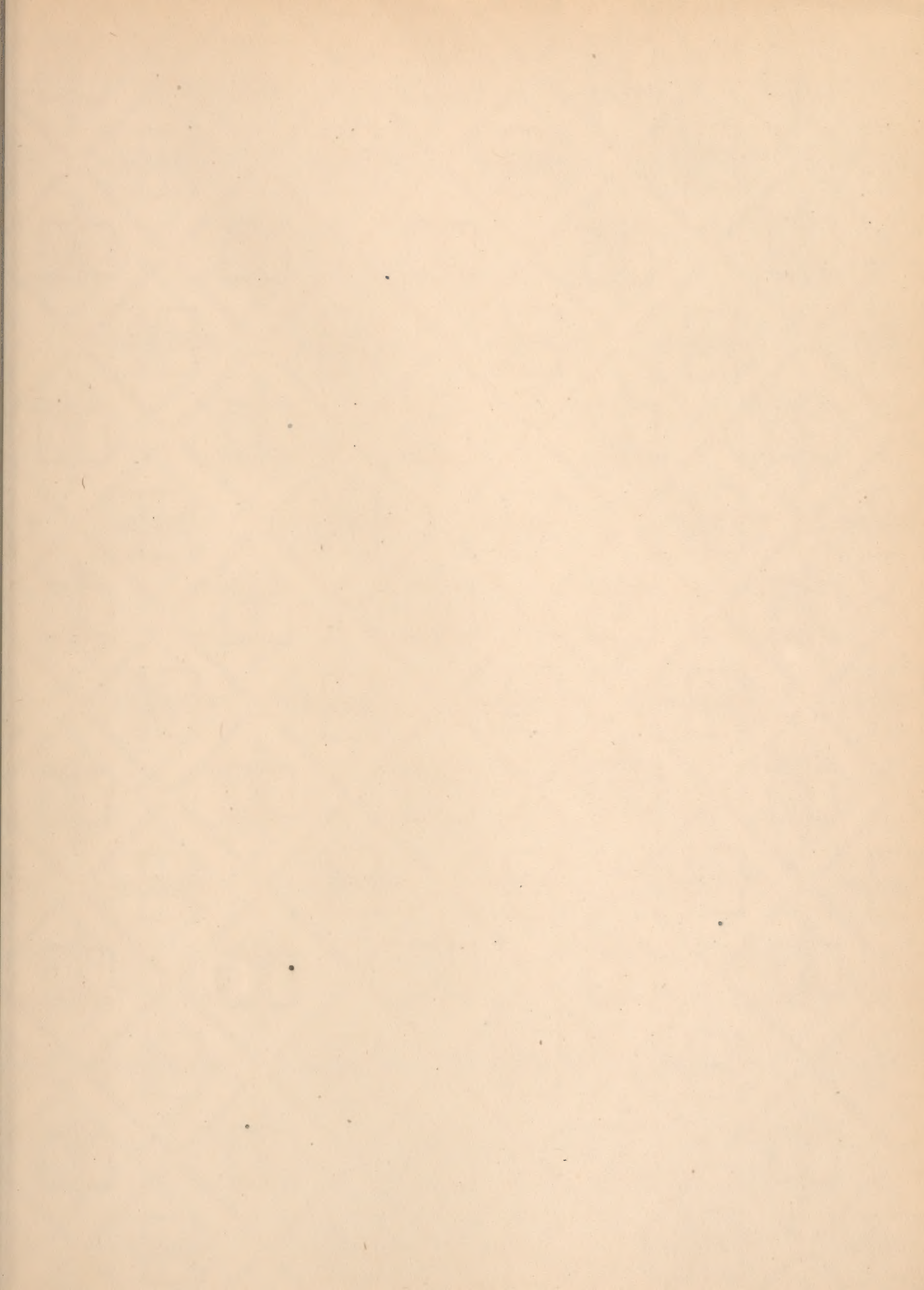
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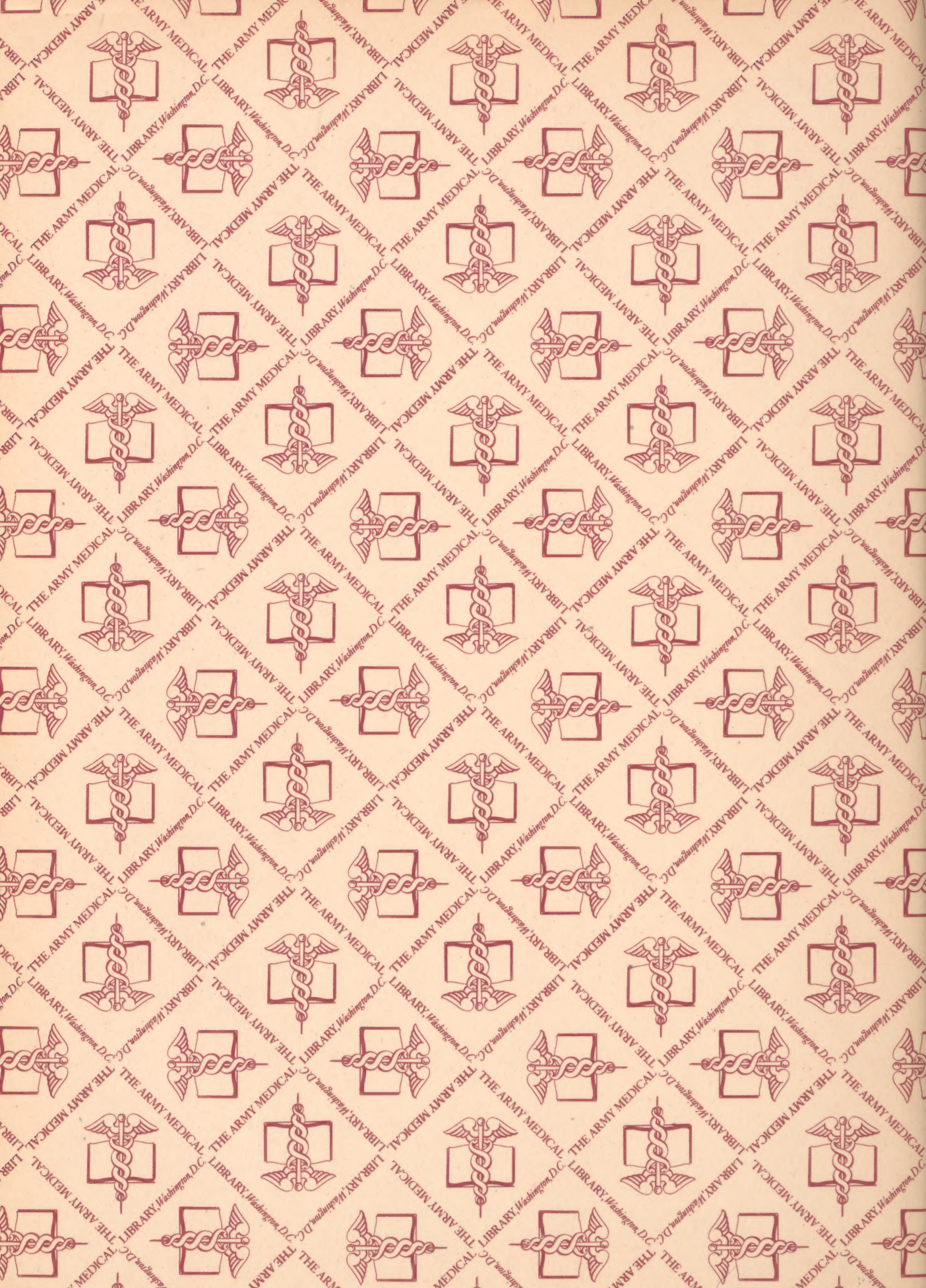


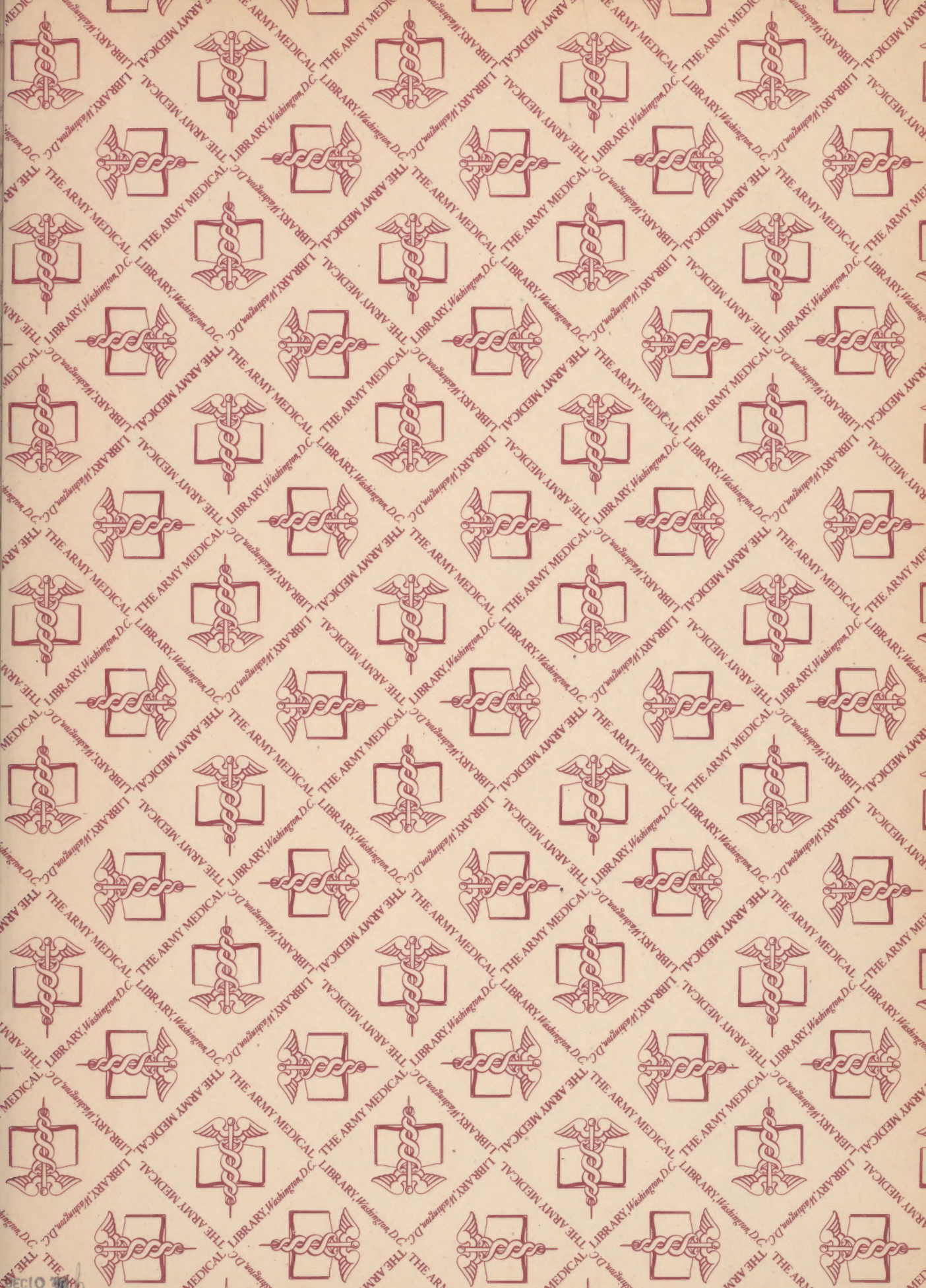
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